EFFECTS OF TEMPOROMANDIBULAR JOINT ANKYLOSIS ON DENTITION AND RAMUS HEIGHT

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ABSTRACT

Objective: *To determine dentition related problems in patients with TMJ ankylosis and to establish effect of TMJ ankylosis on ramus height.*

Material and method: *This descriptive study was conducted at Khyber College of Dentistry, Peshawar Pakistan, from July 2020 to July 2021. Medical records and Cone beam computed tomography of 20 patients with the diagnosis of temporomandibular joint ankylosis were included in the study.*

Results: *Most of the patients presented with unilateral TMJ ankylosis (n=15, 75%) In unilateral ankylosis, the affected side ramus and body (4.89cm, 7.63cm respectively) were less than the non-affected sides (5.54cm, 8.15cm) respectively. Dentition crowding with malposed teeth was present in all bilateral TMJ ankylosis patients and 9 patients in unilateral cases.*

Conclusion: *This study established the effect of TMJ ankylosis on the dentition and ramus height. The height of the ramus was deficient on the affected side and the erupted teeth were crowded in most of the patients.*

Key words: *TMJ ankylosis, dentition, crowding, ramus height.*

INTRODUCTION

TMJ ankylosis is the fibrous or bony adhesion of mandibular condyle with glenoid fossa, maxilla, zygoma or base of the skull resulting in loss of TM joint function.[1] TMJ ankylosis can be unilateral in which only one joint is affected or bilateral where both joints are involved. It can also be classified according to location (extracapsular or intracapsular), type of tissue involved (bony, osseous or fibro-osseous) or extent of fusion (complete or incomplete)(figure 3).

Trauma is the leading cause of TMJ ankylosis.[2] In a study conducted in Pakistan, 95% of the patients reported with TMJ ankylosis were having history of previous trauma, while in 3.6% of cases the exact etiology was not established.[3] Whatever the cause may be, the resulting effects of TMJ ankylosis are very debilitating resulting in limited mouth opening and difficulty in eating, chewing, digestion, speech and oral hygiene maintenance. If it occurs in a young age, there can be disturbance in normal lower jaw growth leading to serious dentition issues, deficient mandible, craniofacial abnormalities and secondary complications including obstructive sleep apnea.[1]

The development and eruption of normal dentition depends completely on the normal growth of mandible. Tooth buds remains stable in jaw until root formation begins. Normal eruption pathway for incisors, canines and premolars is vertical while for that of molars is lingual.[4] Trauma to condyle at younger age does interfere with the development of teeth because decreased growth of mandibular body decreases the space needed for tooth eruption.[5] In TMJ ankylosis, decrease in space may result in failure of eruption of multiple teeth, retained deciduous teeth, crowding, malposed teeth, increased overjet with proclined anterior teeth, multiple carious or broken down teeth with periodontal disease and bad oral hygiene.[6]

All the effects of TMJ ankylosis on dentition depends on the time of age it happened and the severity of damaged it has caused. Apart from func-

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tional deprivation, there is esthetic compromise as well. Patients with unilateral TMJ ankylosis may present with deficient mandible and deviation of chin on the affected side along with dental midline shift. Posterior facial height remains decreased due to disruption of condylar growth center on the affected side (figure 1 and 2). One of the study conducted established that upto 3cm mandibular length was deficient on the affected side, when compared with normal side. Similarly the mandibular ramus height remained deficient by 1.5 upto 2cm when compared with normal side in all age groups. In bilateral ankylosis cases, the growth of mandible is affected on both sides with normal maxillary growth, resulting in retrognathia and convex facial appearance.[7]

The objective of this study is to determine dentition and esthetic related problems in patients with TMJ ankylosis which may help to manage such patients and prepare strategies to improve quality of life of such patients.

MATERIAL AND METHODS:

This study was conducted at Khyber College of Dentistry, Peshawar Pakistan, from July 2020 to July 2021. Medical records and Cone beam computed tomography of 20 patients with the diagnosis of temporomandibular joint ankylosos were included in the study. Cases with absence of CBCT, pre-existing medical conditions, craniofacial syndrome and third molar impactions were excluded. Data such as age, gender, limitation of mouth opening, facial asymmetry, erupted teeth, un-erupted teeth, impacted teeth retained deciduous teeth, unilateral or bilateral TMJ ankylosis along with ramus height and body length before surgery were retrieved from medical records of the patients. Rami heights were calculated by using the measurements taken from the study of Hu HY8 (figure 5). The ramus height was radiographically measured from reference planes taken as Frankfort horizontal plane and vertical intersecting line towards the point gonian. Same linear measurements were applied to orthopantamogram (figure 6). Since the measurements were taken from conebeam computed tomography, there is no magnification factor involved. The collected data was analyzed by using IBM SPSS software version 22. Ethical clearance was obtained from the Research and Ethical committee of Khyber College of Dentistry, and permission was sought from the ethical review board before the study was conducted.

RESULTS

The mean age group was 12 years with male to female ratio of 13:7. Majority of patients (75%) were having low socioeconomic status (table 1). Most of the patients presented with unilateral TMJ ankylosis (n=15, 75%) while only few had bilateral ankylosis (Table 2). In unilateral ankylosis, the mean measurements of affected side ramus and body (4.89cm, 7.63cm respectively) were less than the non-affected sides (5.54cm, 8.15cm respectively) while in bilateral TMJ ankylosis, both sides had little difference as shown in table 4. Among 20 patients of TMJ ankylosis, only 2 patients (10%) patients had un-erupted or retained deciduous teeth (table 3). The effect of unilateral and bilateral TMJ ankylosis on teeth eruption was found statistically not significant, with a P value of 0.741 and 0.219 respectively. Crowding with malposed teeth were present in all

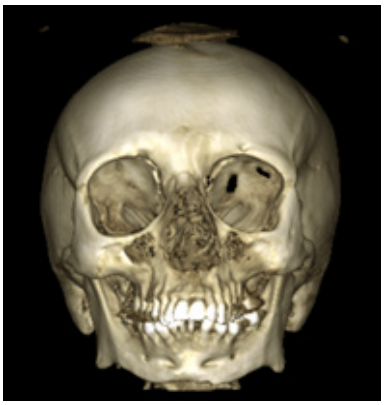


Figure 1

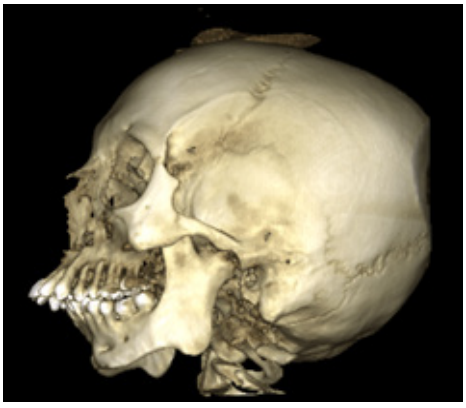
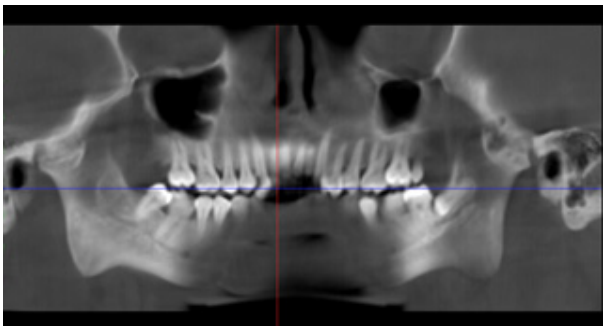


Figure 2



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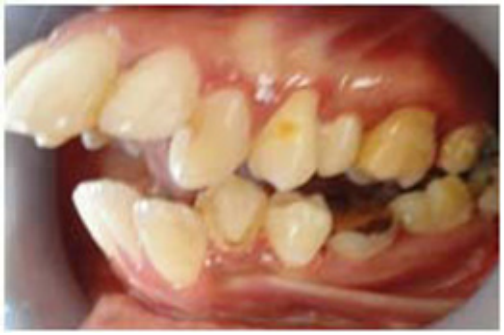

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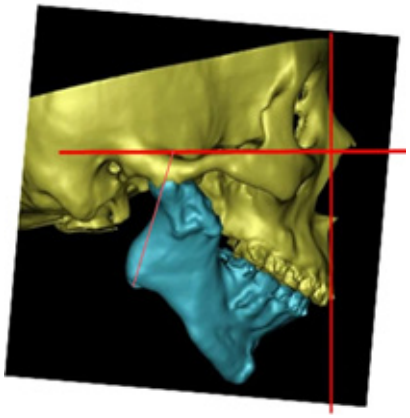

Figure 5

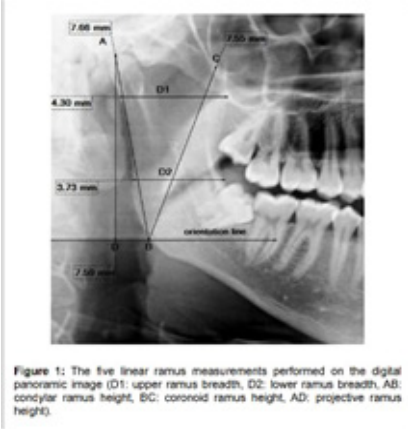

Figure 1: The five linear ramus measurements performed on the digital panoramic image (D1: upper ramus breadth, D2: lower ramus breadth, AB: condylar ramus height, BC: coronoid ramus height, AD: projective ramus height).

Figure 6

Table 1; Age, gender and socioeconomic status

	Number of Patients, N	Minimum - Max	Mean	Total
Age Of Patient	20	7-21 years		100 %
Gender of patient	20	M=13	65%	100 %
		F=7	35%	
Socio-economic status	20	Satisfactory= 7	35%	100
		Poor =13	65%	

Table 2; Site of TMJ ankylosis

	Frequency	Percent
unilateral	15	75.0
bilateral	5	25.0
Total	20	100.0

Table 3; Effect on eruption of teeth

	Effect on eruption of teeth	No effect on eruption of teeth	Total	P value
Bilateral TMJ Ankylosis	1	4	5	0.219
Unilateral TMJ ankylosis	1	14	15	0.741

Table 4; Ramus height and length

	Rami height Mean	Body length Mean
Unilateral TMJ ankylosis	Affected side=4.89cm	Affected side=7.63cm
	Unaffected side=5.54cm	Unaffected side=8.15cm
Bilateral TMJ ankylosis	Right side=4.36cm	Right side=6.9cm
	Left side =4.22cm	Left=7.04cm

Table 5; Crowding of dentition

	Crowding		Total frequency
	Yes	No	
Unilateral ankylosis	9 (60%)	6 (40%)	n=15,
Bilateral ankylosis	5 (100%)	0	n=5

bilateral TMJ ankylosis patients and 9 patients in unilateral cases (table 5).

DISCUSSION

This study established the effect of TMJ ankylosis on dentition and rami height. The importance of dentition along with jaw growth cannot be ignored while considering treatment outcomes in patients with TMJ ankylosis. Dental problem is the most hidden yet grievous issue, but till date, its association with TMJ ankylosis is not addressed properly. A study conducted in India stated that TMJ ankylosis impedes the normal eruption of the teeth.[5] Our study included 20 patients of TMJ ankylosis with age group ranging from 7 years to 21 years. Majority of the patients presenting with limitation of mouth opening were males (65%) followed by females (35%). This result is in contrast with the findings of a study done by Mekonnen D et al in Ethiopia, according to which majority of cases involved females (55.8%) rather than males)44.2%).[9] This difference can be due to difference in sampling or variations in study population. Unilateral TMJ ankylosis was more common in our study compared to bilateral TMJ ankylosis that comprised of only 25% cases , majority involving the left side (50%) followed by right side(25%). This result is similar to another study conducted by Murad N in pakistan[10], but inconsistent with studies done in india[11] and sudan[12]. Similarly, in unilateral TMJ ankylosis, left side was more involved than right side TMJ which is in agreement with study conducted in china.[13]

In normally growing mandible, the bone deposition occurs on posterior border of ramus and there is resorption on anterior border of ramus at the same time. This moves ramus backwards in relation to body thus creating space for normal eruption of teeth.[14] The mean normal ramus height in children from age 7-17 years is 4.79cm with no gender differences.[15] From 18-29 years onwards, mean ramus height for males is 7cm while for females is 6.4cm. Similarly mean body height on one side in males is 9.6cm while in females it is 9.4cm.[16] In our study findings, there was shortening of both ramus and unilateral body on affected ankylosed side. In unilateral cases, ramus height on affected side was 0.7mm to 1.1cm shorter compared with the normal side, while shortening of the body length ranged from 0.1mm upto 1.3cm. According to another study, ramus shortening can be up to 2cm while body length can be deficient by 3cm, on affected side, in all age groups.[7] The isometric contractions of the masticatory muscles (pterygomasseteric sling) leads to shortening of the mandibular ramus height and restricted growth and downturn of the chin leading to accentuation of the antegonial notch.[17]

In our study, eruption of the teeth in majority patients seemed normal with no impacted permanent or retained deciduous teeth. Only one patient had impacted lower second premolar while 2 patients had retained deciduous posterior teeth in all four quadrants. The credit for this finding goes to early diagnosis and timely intervention. In contrast, the study conducted in india[5] showed abnormal eruption patterns of teeth, especially of second molars in 88.89% of the unilateral ankylosis cases. This lead to a conclusion that, in long standing cases where patients fail to present early can present with serious dental issues like retained deciduous teeth and impacted or malposed permanent teeth. Limited access to early treatment, lack of awareness, limited resources and financial burdens are the major reasons for delay in the presentation of the patients, as most of the patients were from rural areas and had poor socioeconomic status.[18,19]

Another dental problem that is worth mentioning in patients with TMJ ankylosis is the presence of bad oral hygiene accompanied by multiple carious teeth (**figure 4**). The oral hygiene in all our patients was poor along with the presence of multiple grossly carious teeth. Its quiet obvious that limited mouth opening makes teeth cleaning and restoration maneuvers difficult or even impossible to perfom resulting in chronic periodontal problems and loss of teeth.[20] Additionally, due to deficient space on ankylosed side, permanent teeth do erupt but may lead to crowding and malposition, further compromising oral hygiene of the patient. In our study 70% patients had crowding while 25% of patients with bilateral ankylosis had proclination of the anterior lower teeth to compensate for the short mandible's relation with normal growing maxilla.

CONCLUSION

This study established the effect of TMJ ankylosis on the dentition and ramus height. The height of the ramus was deficient on the affected side and the erupted teeth were crowded in most of the patients.

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